

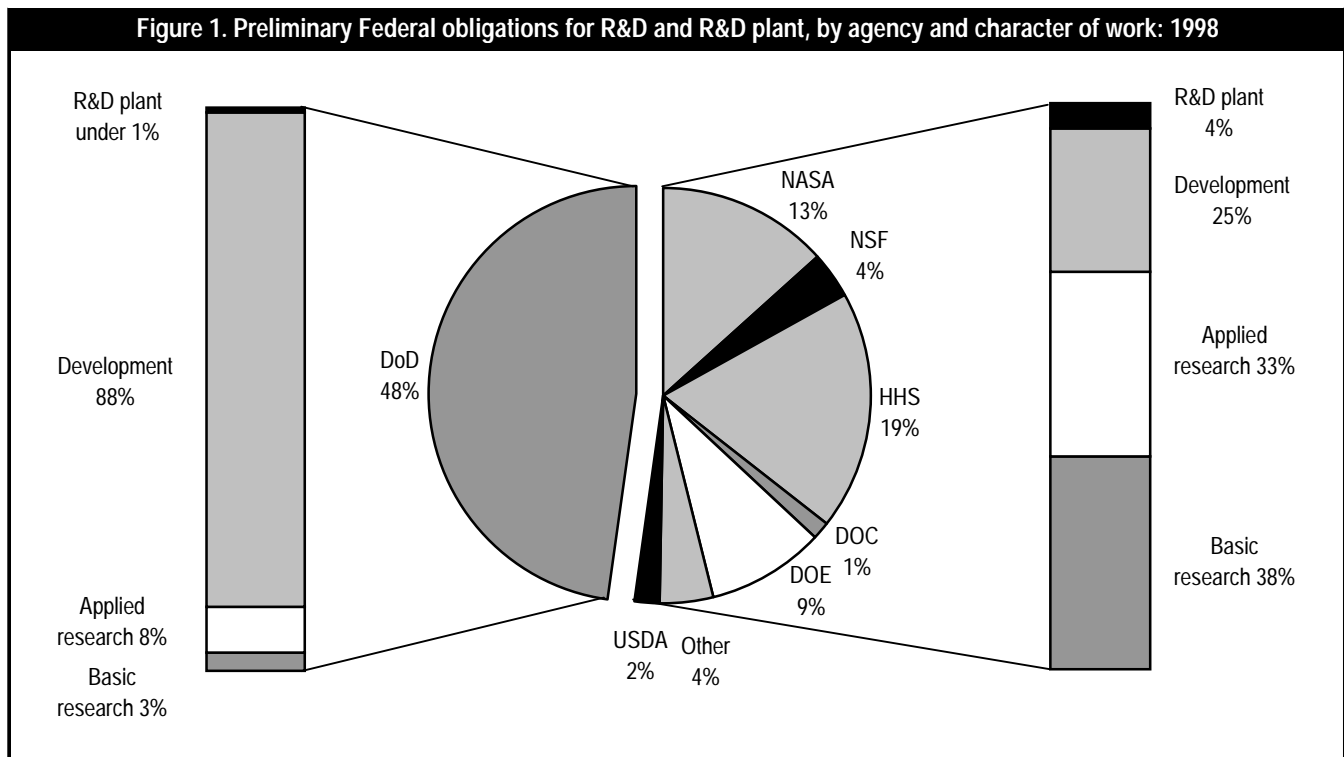
OVERVIEW

INTRODUCTION

Federal agencies expect their funding for research and development (R&D) and R&D plant to decrease about 1 percent (2-percent decrease in inflation-adjusted 1992 dollars) to \$72 billion in fiscal year (FY) 1998, according to survey reports received during the period May through August 1997. Development and R&D plant account for the R&D decrease, declining by 2 percent (a 4-percent decrease in constant 1992 dollars) and 13 percent (15-percent decrease in constant 1992 dollars), respectively, from estimated FY 1997 levels (to \$40 billion and \$2 billion, respectively). Research spending (including basic and applied research) will increase 2.5 percent (to \$30 billion). But after adjusting for inflation, Federal obligations for research will rise slightly, by under 1 percent. Research accounts for 42 percent of the FY 1998 total R&D money. The estimated obligations provided in this report are subject to change as Federal agencies' budgets are updated to reflect approved programs.

AGENCY TOTAL FUNDING SHARES

Seven Federal agencies, out of the 31 that report to the R&D survey, account for 96 percent (\$69 billion) of total projected Federal funding for R&D and R&D plant in FY 1998 (figure 1). The Department of Defense (DoD) will continue to comprise the largest share (48 percent), as it has throughout the 1990s, even though its funding will decrease 2.5 percent from its estimated FY 1997 level. Contributing to DoD's drop in overall R&D funding are the combined Defense agencies (9 percent decrease), the Army (8 percent decrease in its military functions component), and the Navy (4 percent decrease). Within the Defense agencies, the Ballistic Missile Defense Organization (BMDO) (down 24 percent), Washington Headquarters Services (WHS), and Special Operations Command (both down 7 percent) report the largest percentage decreases in proposed R&D funding. Also, the Office of the Director for Operational Test and Evaluation reports a 6-percent decrease in funding for R&D in FY 1998.



SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998.

Funding from the Department of Health and Human Services (HHS) will comprise the second largest share of Federal agencies' R&D funding (19 percent), increasing by 1 percent from its FY 1997 level. Most (94 percent) of the HHS amount is from its National Institutes of Health (NIH) for support in the life sciences. The other top funding agencies are the National Aeronautics and Space Administration (NASA) (13 percent of the FY 1998 Federal R&D and R&D plant total), the Department of Energy (DOE) (9 percent), the National Science Foundation (NSF) (4 percent), the Department of Agriculture (USDA) (2 percent), and the Department of Commerce (DOC) (1 percent). Almost all (98 percent) of DOC's funding is from its National Institute of Standards and Technology (NIST) and National Oceanic and Atmospheric Administration (NOAA). Three of the 11 agencies within USDA reporting funding for R&D account for 94 percent of USDA's R&D obligations: Agricultural Research Service, \$0.8 billion; Cooperative State Research, Education, and Extension Service, \$0.4 billion; and Forest Service, \$0.2 billion. DOC and USDA each estimate that combined R&D and R&D plant funding will decline in FY 1998, whereas such funding from DOE, NASA, and NSF is slated to increase.

R&D GROWTH IN THE 1990s

Of the seven major R&D funding agencies, DOC reports the largest estimated R&D and R&D plant funding annual growth rate for the FY 1990-98 period (11 percent, 8 percent in constant 1992 dollars) (table 1). DOC's growth reflects the rapid increases in funding at NIST which peaked at more than \$0.6 billion in FY 1995. Even though reporting a projected small decrease in overall R&D funding in FY 1998, NIST increased its obligations from \$131 million (\$141 million in constant dollars) in FY 1990 to \$510 million (\$444 million in constant dollars) in FY 1998, representing an average annual increase of 19 percent (16 percent increase in constant dollars). However, the FY 1998 NIST R&D funding level is \$130 million (\$150 million in constant dollars) below what it was in FY 1995, representing an average annual decrease of 9 percent (7 percent decrease in constant dollars). HHS follows DOC with a 6-percent growth rate (3 percent in constant dollars) during the same period. NSF reports an average 5-percent growth per year (2 percent in constant dollars) for its R&D and R&D plant funding from FYs 1990-98. DoD's obligations drop on average 1 percent annually. In constant dollars, its funding decreases at an

Table 1. Federal obligations for R&D and for R&D plant: FYs 1990-98

Agency	FY 1990 actual	FY 1991 actual	FY 1992 actual	FY 1993 actual	FY 1994 actual	FY 1995 actual	FY 1996 actual	FY 1997 preliminary	FY 1998 preliminary	Average annual percent change FYs 1990-98
(Millions of current dollars)										
Total.....	65,831	64,148	68,577	70,415	69,428	70,997	69,409	71,996	71,593	1.1
DoD.....	37,756	32,561	36,526	36,221	34,788	34,427	34,542	34,996	34,118	-1.3
HHS.....	8,513	9,842	9,085	10,499	11,142	11,711	12,086	13,137	13,324	5.8
NASA.....	7,060	8,004	8,475	8,769	8,812	9,640	8,988	9,415	9,599	3.9
DOE.....	6,547	7,203	7,493	7,724	6,960	6,890	6,051	6,434	6,449	-0.2
NSF.....	1,729	1,945	1,970	2,012	2,212	2,439	2,376	2,424	2,519	4.8
USDA.....	1,211	1,381	1,492	1,470	1,525	1,523	1,430	1,562	1,476	2.5
DOC.....	454	505	672	682	857	1,214	1,152	1,075	1,059	11.2
Other.....	2,562	2,707	2,864	3,038	3,133	3,154	2,785	2,954	3,049	2.2
(Millions of constant 1992 dollars)										
Total.....	70,672	66,030	68,577	68,604	66,047	65,848	62,921	63,860	62,320	-1.6
DoD.....	40,532	33,516	36,526	35,289	33,093	31,930	31,313	31,041	29,698	-3.8
HHS.....	9,139	10,131	9,085	10,228	10,599	10,862	10,957	11,652	11,598	3.0
NASA.....	7,579	8,239	8,475	8,544	8,382	8,941	8,147	8,351	8,356	1.2
DOE.....	7,028	7,415	7,493	7,525	6,621	6,390	5,485	5,707	5,614	-2.8
NSF.....	1,856	2,002	1,970	1,961	2,104	2,262	2,153	2,150	2,193	2.1
USDA.....	1,300	1,422	1,492	1,432	1,451	1,413	1,297	1,385	1,285	-0.1
DOC.....	487	520	672	664	816	1,126	1,044	953	922	8.3
Other.....	2,751	2,786	2,864	2,960	2,980	2,925	2,524	2,620	2,654	-0.4

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998.

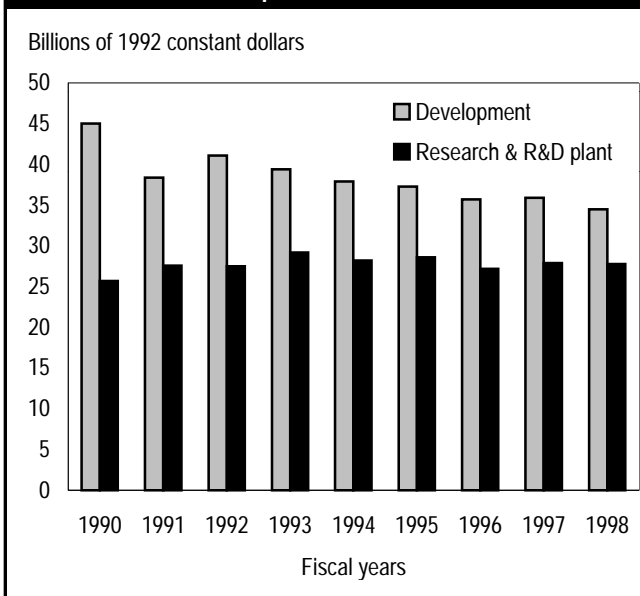
estimated annualized rate of 4 percent over this eight-year period.

DEVELOPMENT FUNDING

As in the past, the Federal Government obligates the largest portion of its R&D dollars for development, which accounts for approximately 55 percent of the FY 1998 preliminary total R&D and R&D plant obligations. However, the development share has been decreasing throughout the 1990s, having declined from its peak 64-percent share in FY 1990 (figure 2). Agencies expect development funds to drop 2 percent (down 4 percent in constant 1992 dollars) from their FY 1997 level, to \$40 billion (\$34 billion in constant 1992 dollars) in FY 1998.

Six agencies account for 99 percent of estimated Federal development obligations in FY 1998 (table 2). These agencies are DoD (more than 80 percent from the three service agencies—Army, Navy, and Air Force), NASA, DOE, HHS (almost entirely from NIH), Department of Transportation (DOT) (more than 90 percent from the Federal Aviation Administration and Federal

Figure 2. Federal obligations for R&D and R&D plant: FYs 1990–98



NOTE: Data for FYs 1997–98 are preliminary.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998.

Table 2. Federal obligations for development: FYs 1990–98

Agency	FY 1990 actual	FY 1991 actual	FY 1992 actual	FY 1993 actual	FY 1994 actual	FY 1995 actual	FY 1996 actual	FY 1997 preliminary	FY 1998 preliminary	Average annual percent change, FY 1990–98
(Millions of current dollars)										
Total.....	41,937	37,327	41,102	40,424	39,824	40,166	39,398	40,488	39,620	-0.7
DoD.....	33,739	28,417	32,056	31,066	30,313	30,012	30,499	31,021	30,123	-1.4
NASA.....	3,473	3,909	4,428	4,471	4,456	4,969	4,692	4,940	5,095	4.9
DOE.....	3,060	2,709	2,760	2,822	2,766	2,685	1,983	2,189	1,960	-5.4
HHS.....	939	1,594	1,042	1,157	1,285	1,379	1,407	1,488	1,587	6.8
DOT.....	247	265	288	319	347	356	174	206	218	-1.6
DOC.....	61	40	55	74	108	244	217	191	182	14.6
USDA.....	47	61	66	76	77	81	80	89	89	8.3
Other.....	371	331	406	439	473	440	344	365	365	-0.2
(Millions of constant 1992 dollars)										
Total.....	45,021	38,422	41,102	39,384	37,884	37,253	35,715	35,912	34,488	-3.3
DoD.....	36,220	29,251	32,056	30,267	28,836	27,835	27,649	27,515	26,221	-4.0
NASA.....	3,728	4,024	4,428	4,356	4,239	4,609	4,254	4,382	4,435	2.2
DOE.....	3,285	2,789	2,760	2,749	2,631	2,490	1,797	1,942	1,706	-7.9
HHS.....	1,008	1,640	1,042	1,127	1,223	1,279	1,276	1,320	1,381	4.0
DOT.....	266	273	288	311	330	330	158	182	190	-4.1
DOC.....	66	41	55	72	103	226	197	169	159	11.7
USDA.....	51	63	66	74	74	75	73	79	78	5.5
Other.....	399	341	406	427	450	408	312	323	318	-2.8

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998

Highway Administration), and DOC (more than three-fourths from NIST). After adjusting for inflation, half of these agencies report an expected decrease in development funding for FY 1998: DOE (down 12 percent), DOC (down 6 percent), and DoD (down 5 percent).

To better understand the component pieces of Federal R&D funding and to allow a closer look at the funding activity of DoD agencies that report to the Survey of Federal Funds for Research and Development, NSF collects data on DoD development dollars in two categories: advanced technology development and major systems development. Advanced technology includes

development for military and nondefense applications. Major systems includes testing and evaluation of mostly defense-related systems. This *Federal Funds* volume is the third report to include such statistics on development funding.

DoD expects to provide \$26 billion (87 percent of its total development obligations) toward major systems development, which represents a 1-percent drop in FY 1998 (down 3 percent in constant 1992 dollars) (table 3). Combined, the Air Force, Navy, Army (its Military Functions component), and BMDO expect to account for \$25 billion (95 percent) of the estimated

Table 3. Federal obligations for development by agencies in DoD: FYs 1994–98

Agency and character of work	FY 1994 actual	FY 1995 actual	FY 1996 actual	FY 1997 preliminary	FY 1998 preliminary	Percent change FYs 1997–98
	(Millions of current dollars)					
Total DoD.....						
Basic research.....	1,222	1,264	1,138	1,029	1,117	8.5
Applied research.....	3,040	3,070	2,858	2,868	2,791	-2.7
Development 1/.....	30,313	30,012	30,499	31,021	30,123	-2.9
Advanced technology.....	4,461	4,556	4,449	4,399	3,815	-13.3
Major systems.....	25,812	25,450	26,039	26,610	26,295	-1.2
Army.....						
Development.....	4,721	4,567	4,203	4,202	3,875	-7.8
Advanced technology.....	1,187	1,087	695	736	431	-41.4
Major systems.....	3,514	3,584	3,496	3,453	3,431	-0.6
Navy.....						
Development.....	8,082	8,083	7,713	7,272	6,951	-4.4
Advanced technology.....	412	592	455	547	437	-20.1
Major systems.....	7,670	7,731	7,258	6,725	6,514	-3.1
Air Force.....						
Development.....	11,713	10,963	12,160	13,055	13,589	4.1
Advanced technology.....	448	456	495	399	383	-4.0
Major systems.....	11,265	11,415	11,665	12,656	13,206	4.3
Total defense agencies.....						
Development.....	5,553	6,145	6,144	6,229	5,414	-13.1
Advanced technology.....	2,414	2,958	2,804	2,717	2,564	-5.6
Major systems.....	3,120	3,204	3,340	3,512	2,851	-18.8
Operational test and evaluation.....						
Development.....	11	22	22	25	23	-6.1
Advanced technology.....	0	0	0	0	0	-
Major systems.....	11	22	22	25	23	-6.1
Test and evaluation.....						
Development.....	232	231	258	238	270	13.1
Advanced technology.....	0	0	0	0	0	-
Major systems.....	232	231	258	238	270	13.1

1/ DoD development does not equal the sum of the advanced technology and major systems detail because some DoD agencies could not break down development into these two categories.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998

major systems development obligations. However, three of these four DoD funders expect decreases in major systems development in FY 1998—Army and Navy expect declines of 1 percent and 3 percent, respectively, and BMDO is slated to drop 23 percent. Air Force will increase its funding by \$0.6 billion (4 percent) in FY 1998, while from FYs 1996–97 Air Force increased its funding by nearly \$1 billion (8 percent).

DoD reports that advanced technology development funding will decrease \$0.6 billion (13 percent) to \$4 billion in FY 1998. Six DoD agencies account for most (94 percent) of the estimated advanced technology development funding. They are the Defense Advanced Research Projects Agency (DARPA) (\$1 billion for advanced technology development), BMDO (\$0.7 billion), WHS (\$0.4 billion), and the three service agencies, each with \$0.4 billion. However, each of these agencies reports an expected decrease in funding for advanced technology development from FY 1997—Army down by \$300 million, BMDO down by \$200 million, Navy down by \$100 million, DARPA down by \$28 million, Air Force down by \$16 million, and WHS down by \$15 million.

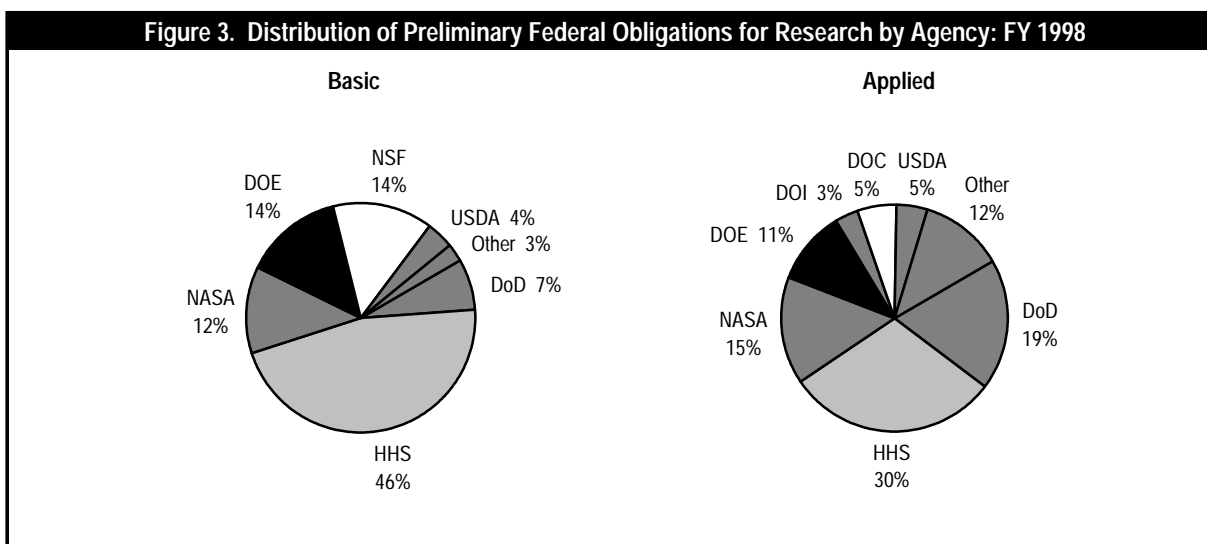
AGENCIES' FUNDING FOR BASIC AND APPLIED RESEARCH

The share of Federal obligations for basic research has been increasing slowly since FY 1992. In FY 1992, basic research comprised 18 percent of total R&D. That percentage increased slightly each year and reaches 21 percent in FY 1998, according to preliminary

estimates. Change in the applied research share has been similar to that for basic research throughout this period. In FY 1992, applied research accounted for 17.5 percent of the R&D total, and its FY 1998 share is also 21 percent. Overall, Federal agencies report a 4-percent average annual rate of growth (1 percent in constant 1992 dollars) for basic research from FYs 1990–98. Federal agencies report about a 5-percent average annual rate of growth (2 percent in constant 1992 dollars) for applied research during this same time period. When adjusted for inflation, however, basic and applied research funding each has held steady at about \$13 billion since FY 1993.

The six lead agencies in basic research funding will account for 97 percent of the Federal basic research total in FY 1998 (figure 3). These agencies are HHS (almost entirely at NIH), NSF, DOE, NASA, DoD, and USDA. Of these six agencies, NASA and USDA report an expected decrease in basic research funding for FY 1998, dropping 5 percent (down \$102 million) and 1 percent (down \$7 million), respectively. Each of the other four agencies expects strong to modest increases in basic research funding in FY 1998: DoD (9 percent), DOE (5 percent), NSF (4 percent), and HHS (1 percent).

Seven agencies will account for 88 percent of the Federal applied research obligations in FY 1998. These agencies are HHS, DoD, NASA, DOE, USDA, DOC, and the Department of the Interior (DOI). DoD and USDA each reports an expected 3 percent decrease in applied research funding for FY 1998 (down \$77 million and \$24 million, respectively). DOC indicates that its FY 1998 applied research funding is nearly the



SOURCE: National Science Foundation, Division of Science Resources Studies, Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998.

same as its FY 1997 level. The other four agencies expect strong to modest increases in applied research funding: NASA (11 percent), DOE (6 percent), HHS (5 percent), and DOI (2 percent).

RESEARCH FUNDING BY SCIENCE AND ENGINEERING FIELDS

Most basic research obligations support work performed in the life sciences (\$7 billion), physical sciences (\$3 billion), engineering (\$2 billion), and

environmental sciences (\$1.5 billion), according to preliminary 1998 estimates. HHS provides the bulk (82 percent) of life sciences funding, while DOE is the largest Federal funder of basic research in the physical and environmental sciences, accounting for 33 percent of their combined total. NASA follows closely, funding 32 percent of basic research in these two science fields.

Agencies also provide more applied research support in the life sciences (\$6 billion, mostly from HHS) than in any other field. However, agencies fund applied research in engineering second most (at \$4 billion), largely provided by DoD (35 percent) and NASA (34 percent).

GENERAL NOTES

Data in the tables of this publication were derived from the Survey of Federal Funds for Research and Development and cover FYs 1996–98. They reflect research and development (R&D) funding levels as reported by 31 Federal agencies in February through August 1997. All agencies that were identified as conducting R&D programs were surveyed.

R&D totals in these tables are given in both outlays and obligations. The R&D obligation data are further categorized according to character of work (basic research, applied research, and development), performer, field of science or engineering (for research but not for development), and Federal R&D funding by State. Obligations for research performance at universities and colleges by fields of science or engineering are also shown, as are R&D plant data.

The amounts reported for each year are expressed in obligations or outlays incurred, or expected to be incurred, in that year, regardless of when the funds may have been authorized, appropriated, or received by an agency, and regardless of whether the funds are identified in an agency's budget specifically for research, development, or R&D plant.

Data for FY 1996 are actual, representing completed transactions. Data for FYs 1997 and 1998 are estimated because they do not represent final actions. The Survey of Federal Funds for Research and Development was conducted during the third quarter of FY 1997. The amounts reported for FY 1997 reflect congressional

appropriation actions as of that period, as well as apportionment and reprogramming decisions as of that time. Data for 1998 represent administration budget proposals that had not been acted on. Authorization, appropriation, deferral, and apportionment actions that were completed after these data were collected will be reflected in later surveys of this series.

Accuracy of the data depends in part on the judgment of the respondent. Since many agency R&D programs are not identified as budget-line items, agency officials must identify R&D and R&D plant activities within broader programs. Over the years personnel of the participating agencies have developed increasing skill and consistency in meeting the survey requirements, and their interaction with the National Science Foundation staff has considerably increased the reliability of the data.

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